

TW8816B3

LCD Flat Panel Processor with Built-in MCU, NTSC/PAL/SECAM Decoder, T-CON and Analog RGB Support

FN7794
Rev.4.00
Feb 21, 2019

General Description

The [TW8816B3](#) is a highly integrated multi-purpose LCD display solution for both analog and digital panels. To reduce BOM cost, TW8816B3 integrates an 8-bit MCU and a CCFL or LED controller. Through multiple input ports, TW8816B3 can directly display video and graphic content from a variety of devices including TV Tuners, DVD players, back-up cameras, DTV/DMB receivers, and navigation/GPS receivers.

Features

- Supports analog inputs including CVBS, S-Video, YPbPr, and RGB signals and digital inputs including 24 bit RGB and 8/16/24 bit YCbCr. Interlaced and progressive ITU 656 inputs are supported.
- Supports both digital and analog panels up to WXGA resolutions
- Integrates cost saving features including LED controller, CCFL controller, programmable panel offset control, and on-chip 8-bit 8051 MCU with SPI interface
- Embedded Image Enhancement
 - Programmable CTI, hue, brightness, saturation, contrast, and sharpness control
 - Black/White Stretch
 - Programmable favorite color enhancement- up to three colors
 - Programmable Gamma Correction tables

Analog Video Decoder

- NTSC (M, 4.43) and PAL (B, D, G, H, I, M, N, N combination), PAL (60), SECAM with automatic format detection
- Advanced synchronization processing for VCR trick play signal
- Three 10-bit ADCs and analog clamping circuit
- Built-in analog anti-aliasing filter
- Fully programmable static gain or automatic gain control for the Y or CVBS channel
- Programmable white peak control for the Y or CVBS channel
- Software selectable analog inputs allows any of the following
 - Up to 4 composite video
 - UP to 3 S-Video
 - Up to 2 analog YPbPr and RGB
- 4-H adaptive comb filter Y/C separation
- PAL delay line for color phase error correction
- Digital PLL for both color and horizontal locking
- Programmable hue, brightness, saturation, contrast, sharpness, Gamma control, and noise suppression
- Automatic color control and color killer

Analog RGB / YPbPr Input

- Built-in sync processor for SOG support
- Built-in Line-locked PLL supporting up to 108MHz
- Built-in input measurement function

Digital Interface

- Allows connection to 8/16/24-bit RGB/YCbCr
- Support both interlaced and progressive ITU 656.

TFT Panel Support

- Supports a variety of Digital single pixel TFT panels and Analog active matrix TFT panels
- Supports digital TTL panel up to WXGA(1280 x 768), 100MHz and analog panel up to WQVGA (480 x 234), 20 MHz
- Supports 3, 4, 6, or 8 bits per pixel format

Built-in Microcontroller

- Supports external SPI Interface and I²C Master interface with GPIO
- Supports 8 MCU GPIO, 1 UART (up to 9600bps)
- Support IR or interrupt with GPIO

CCFL and LED Controller

- Single channel CCFL controller based on push-pull architecture
- Lamp fault monitoring- Lamp Open, Lamp Over-current, Failure to Strike and Over-voltage
- Programmable Lamp Frequency to move EMI spurs out of band
- Analog or digital brightness control. 300:1 dimming range with the digital brightness control.
- Low power stand-by mode
- Fine dimming control step (128 steps)

OSD

- Built-in OSD controller with integrated character 202 ROM fonts, programmable 227 RAM fonts and 512 characters display RAM.
- Multi-window (4) OSD support with color pallet
- 16 font and window colors available
- Support OSD overlay with alpha blending

Image Enhancement

- Programmable hue, brightness, saturation, and contrast controls.
- Sharpness control with vertical peaking
- Programmable CTI control
- Built-in de-interlacing engine
- Independent RGB gain and offset controls
- Panorama/Water-glass scaling
- YCbCr hue adjustment
- Programmable Gamma correction tables
- Programmable favorite color enhancement

Power Management

- Supports Panel power sequencing.
- Supports DPMS for monitor power management.
- 1.8 / 3.3 V operation

Timing Controller (TCON)

- Support programmable interface signals for control
- Column (source) driver/row (gate) driver

Miscellaneous

- Supports 2-wire serial bus interface
- Spread spectrum PLL
- Low-speed ADC for KEY scan
- Programmable panel VCOM offset control
- 5V tolerant I/O
- Power-down mode
- DFT
- Typical power consumption < 500mW
- Single 27MHz crystal

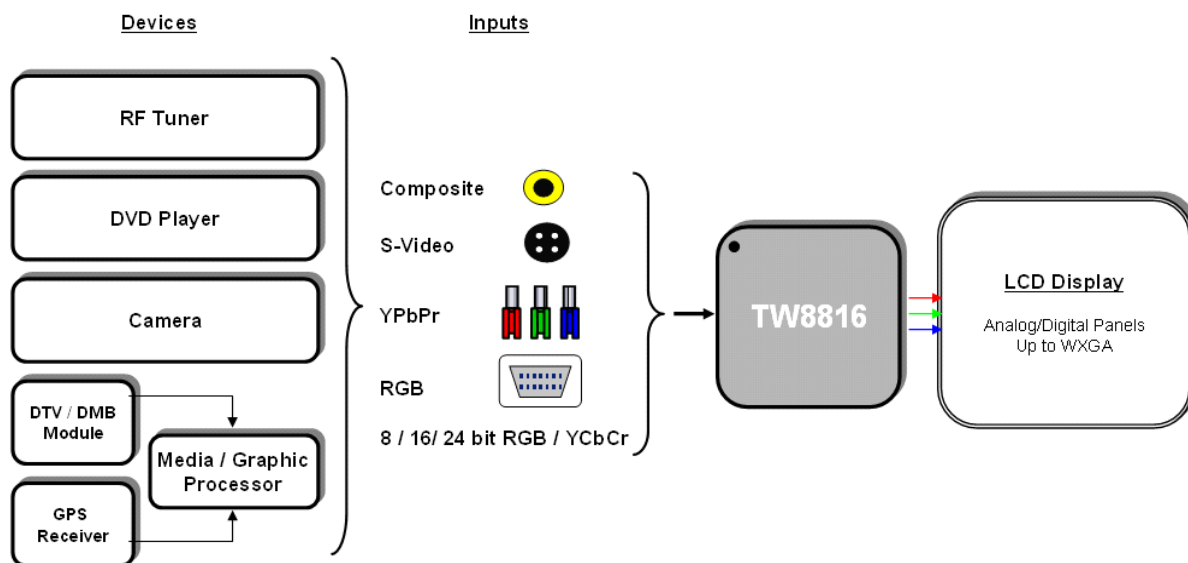


FIGURE 1. TYPICAL DIAGRAM

Notice

1. Descriptions of circuits, software and other related information in this document are provided only to illustrate the operation of semiconductor products and application examples. You are fully responsible for the incorporation or any other use of the circuits, software, and information in the design of your product or system. Renesas Electronics disclaims any and all liability for any losses and damages incurred by you or third parties arising from the use of these circuits, software, or information.
2. Renesas Electronics hereby expressly disclaims any warranties against and liability for infringement or any other claims involving patents, copyrights, or other intellectual property rights of third parties, by or arising from the use of Renesas Electronics products or technical information described in this document, including but not limited to, the product data, drawings, charts, programs, algorithms, and application examples.
3. No license, express, implied or otherwise, is granted hereby under any patents, copyrights or other intellectual property rights of Renesas Electronics or others.
4. You shall not alter, modify, copy, or reverse engineer any Renesas Electronics product, whether in whole or in part. Renesas Electronics disclaims any and all liability for any losses or damages incurred by you or third parties arising from such alteration, modification, copying or reverse engineering.
5. Renesas Electronics products are classified according to the following two quality grades: "Standard" and "High Quality". The intended applications for each Renesas Electronics product depends on the product's quality grade, as indicated below.

"Standard": Computers; office equipment; communications equipment; test and measurement equipment; audio and visual equipment; home electronic appliances; machine tools; personal electronic equipment; industrial robots; etc.

"High Quality": Transportation equipment (automobiles, trains, ships, etc.); traffic control (traffic lights); large-scale communication equipment; key financial terminal systems; safety control equipment; etc.

Unless expressly designated as a high reliability product or a product for harsh environments in a Renesas Electronics data sheet or other Renesas Electronics document, Renesas Electronics products are not intended or authorized for use in products or systems that may pose a direct threat to human life or bodily injury (artificial life support devices or systems; surgical implantations; etc.), or may cause serious property damage (space system; undersea repeaters; nuclear power control systems; aircraft control systems; key plant systems; military equipment; etc.). Renesas Electronics disclaims any and all liability for any damages or losses incurred by you or any third parties arising from the use of any Renesas Electronics product that is inconsistent with any Renesas Electronics data sheet, user's manual or other Renesas Electronics document.

6. When using Renesas Electronics products, refer to the latest product information (data sheets, user's manuals, application notes, "General Notes for Handling and Using Semiconductor Devices" in the reliability handbook, etc.), and ensure that usage conditions are within the ranges specified by Renesas Electronics with respect to maximum ratings, operating power supply voltage range, heat dissipation characteristics, installation, etc. Renesas Electronics disclaims any and all liability for any malfunctions, failure or accident arising out of the use of Renesas Electronics products outside of such specified ranges.
7. Although Renesas Electronics endeavors to improve the quality and reliability of Renesas Electronics products, semiconductor products have specific characteristics, such as the occurrence of failure at a certain rate and malfunctions under certain use conditions. Unless designated as a high reliability product or a product for harsh environments in a Renesas Electronics data sheet or other Renesas Electronics document, Renesas Electronics products are not subject to radiation resistance design. You are responsible for implementing safety measures to guard against the possibility of bodily injury, injury or damage caused by fire, and/or danger to the public in the event of a failure or malfunction of Renesas Electronics products, such as safety design for hardware and software, including but not limited to redundancy, fire control and malfunction prevention, appropriate treatment for aging degradation or any other appropriate measures. Because the evaluation of microcomputer software alone is very difficult and impractical, you are responsible for evaluating the safety of the final products or systems manufactured by you.
8. Please contact a Renesas Electronics sales office for details as to environmental matters such as the environmental compatibility of each Renesas Electronics product. You are responsible for carefully and sufficiently investigating applicable laws and regulations that regulate the inclusion or use of controlled substances, including without limitation, the EU RoHS Directive, and using Renesas Electronics products in compliance with all these applicable laws and regulations. Renesas Electronics disclaims any and all liability for damages or losses occurring as a result of your noncompliance with applicable laws and regulations.
9. Renesas Electronics products and technologies shall not be used for or incorporated into any products or systems whose manufacture, use, or sale is prohibited under any applicable domestic or foreign laws or regulations. You shall comply with any applicable export control laws and regulations promulgated and administered by the governments of any countries asserting jurisdiction over the parties or transactions.
10. It is the responsibility of the buyer or distributor of Renesas Electronics products, or any other party who distributes, disposes of, or otherwise sells or transfers the product to a third party, to notify such third party in advance of the contents and conditions set forth in this document.
11. This document shall not be reprinted, reproduced or duplicated in any form, in whole or in part, without prior written consent of Renesas Electronics.
12. Please contact a Renesas Electronics sales office if you have any questions regarding the information contained in this document or Renesas Electronics products.

(Note1) "Renesas Electronics" as used in this document means Renesas Electronics Corporation and also includes its directly or indirectly controlled subsidiaries.

(Note2) "Renesas Electronics product(s)" means any product developed or manufactured by or for Renesas Electronics.

(Rev.4.0-1 November 2017)

Corporate Headquarters

TOYOSU FORESIA, 3-2-24 Toyosu,
Koto-ku, Tokyo 135-0061, Japan
www.renesas.com

Contact Information

For further information on a product, technology, the most up-to-date version of a document, or your nearest sales office, please visit:
www.renesas.com/contact/

Trademarks

Renesas and the Renesas logo are trademarks of Renesas Electronics Corporation. All trademarks and registered trademarks are the property of their respective owners.